which, being embedded in the solution, give to the whole its temporary rigidity and elasticity. Many other lines of evidence support this view. For instance, the optical evidence shows that the structural elements in the gel are of very fine colloidal dimensions, far below the powers of the microscope. This conclusion that the particles in sol and gel are identical in number and nature shows that nothing analogous to crystallisation has taken place.

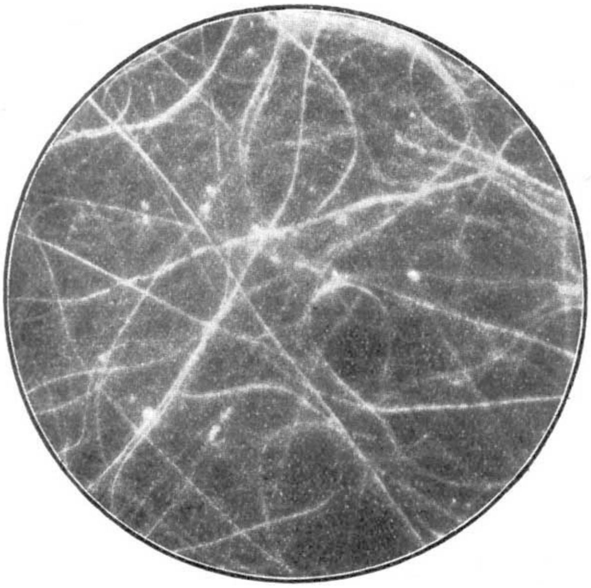

FIG. 1.—Ultramicroscopic appearance of a sodium soap (0·8*N* Sod. Myristate, × 600).

In clear contradistinction to this, curds and coagula are formed by a process closely analogous to crystallisation. Soap sols and gels show almost nothing in the ultramicroscope with its dark ground illumination, but when solidification to white curd begins white fibres of barely microscopic diameter are seen to shoot out until the whole becomes a dazzling white felt of these fine fibres. Fig. 1 (magnification 600) illustrates this appearance in a typical sodium soap, the myristate, in this its permanent stable state. To the naked eye it appears as a hard white cake of soap. Fig. 2, the stearate, exemplifies the more complicated behaviour of soft potassium soaps, in which the fibres that first appear are extremely short, and often twinned, but in which, on standing, true microscopic crystalline plates appear. These tiny crystals undoubtedly account for the "figging" which is seen in most good soft soaps.

Work at the Bristol University laboratory has not been confined to the elucidation of the results here outlined, but an extensive programme of investigation of the colloid and phase-rule phenomena involved in the typical processes of soap boiling is in progress, in the expectation that the precise elucidation of the behaviour of this particularly suitable and characteristic material may lead to the better understanding of some of the typical problems of the physical chemistry of the colloidal state.

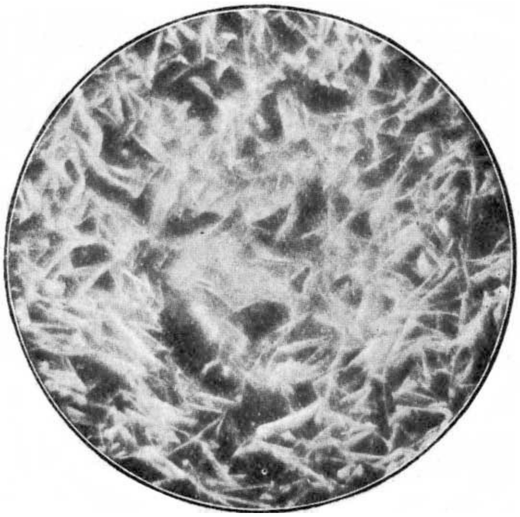

FIG. 2.—Ultramicroscopic appearance of a potassium soap (0·5*N* Pot. Stearate, × 500).

Inland Waterways.[1]

By DR. BRYSSON CUNNINGHAM.

THE outstanding feature of Mr. Minikin's book is the very interesting series of photographic illustrations which it contains;, these impart a most effective realisation of the physical characteristics of the watercourses described in the text. They are a most serviceable adjunct, and some of the views have the additional charm of being picturesque. We reproduce two by way of example.

The work consists of ten chapters, of which the first is preliminary, and the second deals with general considerations relating to torrential phenomena, bends, valleys, and erosion, while chap. iii. is on rainfall. The available rainfall, or run-off, is said to vary between 20 per cent. on permeable soils and 75 per cent. on impermeable ground. As limits, these are perhaps somewhat wide, and might, in this country at any rate, be appreciably narrowed. From a survey of flood discharges in England and Wales it has been computed by Mr. Clayton that in average areas the run-off to the sea is between 50 and 60 per cent. of the total rainfall. Transpiration, as a source of absorption of rainfall, receives little notice. Chap. iv. deals with river surveys, and in particular describes methods applicable to running

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[1] "Practical River and Canal Engineering." By R. C. Royal Minikin. Pp. vii+123+12 plates. (London: Charles Griffin and Co., Ltd., 1920.) 12*s*. 6*d*.

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surveys in unexplored or virgin tracts such as are to be found in Brazil, where the author has had much experience. For computing discharges, the well-known Chezy formula is quoted, but there is no reference to the classic expression of Ganguillet and Kütter, or to the suggested adaptation of Chezy's formula in a very compact form, put forward by Mr. Barnes a few years ago. Chap. v. treats of waterways (watercourses would be a better term), which are classified as torrents, torrential rivers, semi-torrential rivers, and smooth flowing rivers. Chap. vi. deals with floods, chap. vii. with water flow, and the two following chapters with river training and canalisation. Canals are left to the last, and are compressed within the limits of a single chapter.

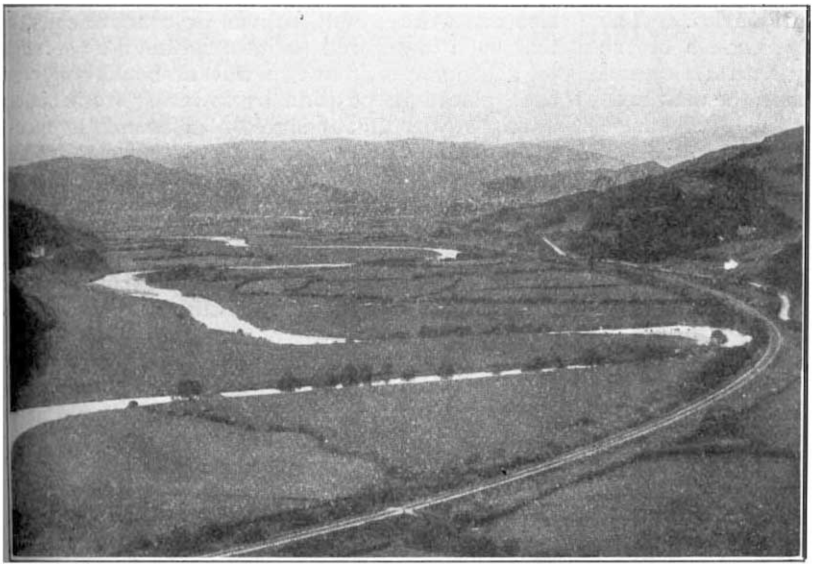

Fig. 1.—Dovey Valley, showing the river meandering from side to side of a broad, flat valley. From "Practical River and Canal Engineering."

From the foregoing outline of the contents, and from the fact that the book contains only 119 pages of matter in fairly large sized print with numerous illustrations, it is evident that the treatment of the subject is necessarily general. Indeed, the author disclaims any attempt to include theoretical considerations in his purview. The explanation of so important a subject as canal construction within the compass of ten pages is obviously insufficient for completeness. As a brief review, however, the book has the merit of being clear and interesting, and the author's experiences in Brazil and elsewhere yield a number of practical hints of serviceable importance.

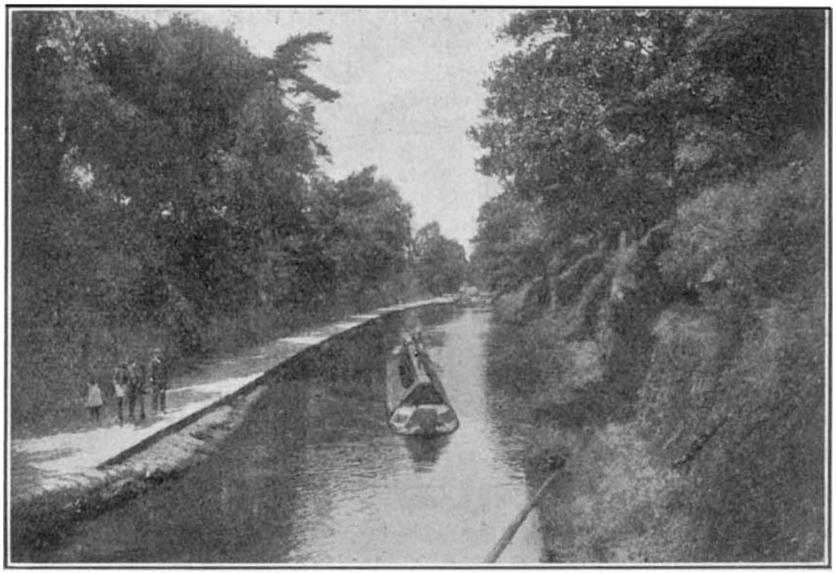

Fig. 2.—Canal in sandstone cutting. From "Practical River and Canal Engineering.

The startling incident recorded on p. 21 of the sudden invasion in clear weather of a trekking camp in Minas Geraes, Brazil, by a torrent from a downpour of rain on the hill summits some few miles away gives a vivid idea of the uncertainties and vagaries of rainfall in some districts. However, it is not necessary to seek an example so far away as Brazil; there was quite recently a disastrous instance of the same kind in Lincolnshire when the town of Louth was swept by a flood without any warning. The author dwells on the influence of vegetation in regard to its effect on rainfall, and says that in Brazil, as in other countries, great loss has been incurred through the careless cutting down of trees to make way for the farmer. He states that many extensive forests have disappeared within the last fifty years, due to the custom of burning down a wooded area to form new plantations as soon as the old, for lack of care, have become exhausted. He believes that the lack of rain upon several districts in Brazil is a direct consequence of this policy; this is an opinion which will, however, not command general acceptance.

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